\_\_\_\_

1500

2500

500

T. 15 S., R. 26 E., sec. 23cb Elev. 4888'

SCALE DISCUSSION The southern Raft River Valley near Bridge, Idaho has long been known as a thermal area (Stearns and others, 1938). In 1971, an area southwest of Bridge was designated the Frazier DEPTH IN meters feet

the Raft River basin.

Known Geothermal Resource Area (Frazier KGRA) by the U.S. Geological Survey (Godwin and others, 1971). A geochemical reconnaissance of thermal waters in Idaho by the U.S. Geological Survey (USGS) in 1972 (Young and Mitchell, 1973) indicated a reservoir temperature near 300° F (150° C) for the Raft River geothermal anomaly. The U.S. Energy Research and Development Administration (ERDA, now the U.S. Department of Energy, DOE), as a result of proposals by the Raft River Rural Electric Cooperative, became interested in the Raft River Valley as a potential site for an experimental binary-fluid

geothermal power plant. During the summer of 1973 the USGS, in cooperation with ERDA, began an

southern Idaho. This program was designed to provide a scientific framework for the evaluation

integrated geological, geophysical, geochemical, and hydrological exploration program in

of a geothermal resource and to test the applicability of various geological, geophysical,

geochemical, and hydrological techniques to the study of geothermal resources. Williams and

others (1976) summarize the early results of this program. In order to obtain the physical data necessary to evaluate these various techniques, a drilling program was begun in the spring of 1974. A total of 34 auger holes were drilled to depths from 25 ft (7 m) to 100 ft (30 m) (Crosthwaite, 1974), to measure the temperatures and flows of the near-surface cold-water aquifers. In cooperation with the Idaho Department of Water Administration, the USGS also drilled 5 continuously cored wells to depths ranging from 250 ft (76 m) to 1,423 ft (434 m) (Crosthwaite, 1976) in order to test geophysical interpretation of the subsurface geology and to provide hydrological, geological, and

geochemical data on the shallow part of the geothermal system. During the early stages of the USGS-ERDA integrated geothermal exploration program, three petroleum test boreholes were being drilled in the Raft River Valley by Standard American Oil Company. Shortly after completion of the petroleum test boreholes and just prior to deep geothermal drilling by ERDA, Standard American Oil Co. provided the USGS cuttings and well logs from the three test boreholes (Oriel and others, 1978). The information from these boreholes was used for initial interpretation of geophysical data and of the deep subsurface geology of

The first Raft River geothermal exploratory borehole (RRGE #1), drilled in early 1975 (REECo, 1975; Covington, 1977a), initially confirmed the existence of hot water (295° F; 146° C) in quantities (600 gal/min; 38 L/sec) suitable for a medium temperature experimental binaryfluid geothermal power plant. Since then RRGE #2 (REECo, 1976; Covington, 1977b); RRGE #3 (Covington, 1977c; Covington, 1977d); RRGE #4 (Covington, 1978), which has been deepened by DOE and is now RRGP #4; and RRPG #5 have been drilled by ERDA in the Raft River geothermal anomaly.

Drilling of the fifth Raft River geothermal borehole (RRGP #5), by Colorado Well Service, began on May 8, 1978. Drilling mud was used as the drilling fluid to 1,510 ft (460 m) where 13 3/8 in (34 cm) surface casing was installed. Drilling then continued using water as the drilling fluid to 3,726 ft (1,136 m) where a bottom hole temperature of  $285^{\circ}$  F (140.5° C) was recorded. A 17 ft (5 m) core was taken to 3,743 ft (1,141 m), the well backfilled, and 9 5/8 in (24.5 cm) production casing installed at 3,408 (1,039 m). When drilling resumed directional techniques were used to drill in a northwesterly direction, with an average drift angle of  $4^{\circ}$ from vertical, to a total depth of 4,911 ft (1,497 m). During geophysical logging, after completion of drilling, a maximum temperature of 273° F (134°C) was recorded.

Drilling period: May 8 to June 22, 1978 Total depth: 4,911 ft 1,497 m Production casing: 3,408 ft 1.039 m Artesian flow: 250 gpm 16 L/S Max. Temp.: 273° F 134° C TOP OF FORMATION

Tertiary--Salt Lake Formation 890 ft. 271 m Precambrian--Quartzite of Yost 4,330 ft. 1,320 m Precambrian--Schist of the Upper Narrows 4,380 ft. 1,335 m Precambrian(?)--Elba Quartzite 4,550 ft. 1,387 m Precambrian--Older schist 4,840 ft. 1,475 m Precambrian--Quartz monzonite 4,890 ft. 1,490 m

Core #1 3,726-3,743 ft (1,136-1,141 m) Tertiary--Salt Lake Formation: Fine sandstone and siltstone in alternating light- and dark-gray laminae. The lighter sandstone laminae are very calcareous in the upper part of the core, becoming slightly calcareous in the lower part. The darker siltstone laminae are slightly calcareous in the upper part of the core, becoming non-calcareous in the lower part. The laminae dip  $20^{\circ}$  at the top of the core and slowly increase downward to 30° at the bottom. The entire core is fractured and faulted, the fractures being mostly healed with calcite. The faults offset no more than a few centimeters, but all display slickensides and some are healed with calcite. The fault and fracture dips range from  $60^{\circ}$  to  $90^{\circ}$ . GEOPHYSICAL LOGS

## Logged Interval

	Dace	reet	eters	Company
Caliper	5-13-78	120-1514	37-461	Schlumberger
Caliper	5-28-78	1509-3742	460-1141	Dresser Atlas
Caliper	9-13-78	3394-4934	1034-1504	Schlumberger
Temperature	5-13-78	40-1514	12-461	Schlumberger
Temperature	5-28-78	10-3740	3-1140	Dresser Atlas
Temperature	6-22-78	70-3370	21-1027	
High Resolution	9-14-78	30-4934	0-1504	Dresser Atlas
Temperature		30 4734	-1304	Sohlumberger
Compensated Densilog-	5-29-78	1508-3742	460-1141	D
Compensated Neutron/Gam		1300 3742	4011-1141	Dresser Atlas
Compensated Neutron-	9-15-78	3396-4934	1035-1504	. C-1-1-1
Formation Density/Gam		3370 4734	103.1-1304	Schlumberger
Compensated Densilog/	5-28-78	1508-3742	4601141	D
Gamma	0 40 /0	1300-3742	401-1141	Dresser Atlas
Dual Induction-Focused	5-28-78	1510-3742	160 11/1	
Dual Induction-Focused	6-22-78		460-1141	Dresser Atlas
		3160-3320	963-1012	Dresser Atlas
Dual Induction-SFL	7-07-78	1513-4916	461-1498	Schlumberger
Dual Induction-SFL	9-13-78	3360-4930	1024-1503	Schlumberger
BHC Acoustilog/Gamma	5-29-78	1508-3735	460-1138	Dresser Atlas
BHC Sonic Log/Gamma	9-13-78	3370-4934	1027-1504	
0,	, , , ,	3370-4334	1027-1304	Schlumberger

Geophysical log abbreviations used in logs: ILD, Deep Induction Laterolog; ILM, Medium Induction Laterolog; SFLU, Shallow Spherically Focused Laterolog; SFLA, Averaged Spherically Focused Laterolog; ASFLA, Averaged Spherically Focused Laterolog, Amplified; SP, Spontaneous Potențial.

## EXPLANATION

Tertiary--Salt Lake Formation: Gray to light-green, thin-bedded to massive, tuffaceous

siltstone and sandstone with minor beds of conglomerate. In the western part of the Raft River Basin the Salt Lake Formation is divided by a volcanic member at Jim Sage Mountain into upper and lower members (Williams and others, 1976). Volcanic member at Jim Sage Mountain (Tsj) consists of rhyolite flows separated in many places by a vitrophyre breccia. The flows are black glassy and red-brown porphyritic-aphanitic calc-alkali rhyolite containing phenocrysts of oligoclase-andesine and pigeonite. The vitrophyre breccia consists of black glass clasts a few centimeters to 2 m in diameter in a yellow and orange matrix of hydrated glass (Williams and others, 1976). Precambrian--Quartzite of Yost: White, sparsely to moderately muscovitic quartzite in beds a foot or less thick, green and greenish-gray coloration due to chromian mica can be found throughout. May contain as much as 10 percent K-feldspar (Compton, 1972). schist and fine-grained gneiss that contains quartz or quartz-feldspar lenses (Compton, Precambrian(?)--Elba Quartzite: White, tan or locally pale green quartzite with muscovitequartz schist between some beds (Compton, 1972). Precambrian--Older schist: Brown and silvery mica-rich schists consisting of muscovite-biotitequartz schist, mica-plagioclase-microcline-quartz schist, and muscovite-quartz schist (Compton, 1972). Precambrian--Quartz monzonite: Gneissic, light to dark greenish gray with a trace of pyrite and

Formational contacts and lithologic changes within the Salt Lake Formation are based solely on the well cuttings and may not correspond exactly to changes in the geophysical logs. Cuttings and core were examined and described in the office and lithologic breaks assigned without the use of geophysical logs. Lithologies above the surface casing are described but not shown since they vary little from well to well and have been shown in previous reports (Covington, 1977a; Covington, 1977b). Sample depth control was maintained, through the use of a corbide lag, by Rocky Mountain Geo-Engineering Company. Directional drilling surveys below 3,450 ft (1,052 m) were carried out by Eastman Whipstock, Inc. Geophysical logging was carried out by Dresser Atlas Wireline Services and Schlumberger Well Services. Calibration of individual geophysical logs changes from run to run and has been adjusted to a single calibration for this report. The Caliper log below 3,570 ft (1,088 m) is from the Schlumberger Compensated Neutron-Formation Density log, run on September 15, 1978. The Temperature log used in this report is the Schlumberger High Resolution Temperature log, run on September 14, 1978. The Gamma log used in this report above 3,475 ft (1,059 m) is from the Dresser Atlas Compensated Densilog-Compensated Neutron log, run on May 5, 1978; below 3,475 ft (1,059 m) the Gamma log is from the Schlumberger Compensated Neutron-Formation Density log, run on September 15, 1978.

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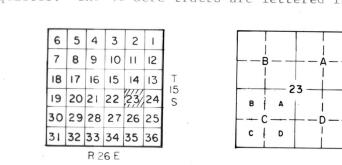
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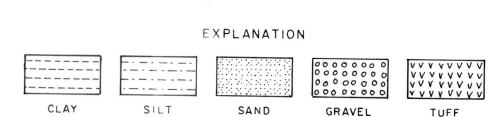
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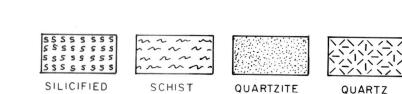
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## WELL-NUMBERING SYSTEM

Idaho well numbers indicate the locations of wells within the official rectangular subdivisions of the public lands, with reference to the Boise Base Line and meridian. The first two segments of a number designate the Township and Range (T. 15 S., R. 26 E.). The third segment is the section number, followed by two letters which indicate the quarter-section, and the 40-acre tract (sec. 23cb). Quarter sections are lettered A, B, C, and D in counterclockwise order from the northeast quarter. The 40-acre tracts are lettered in the same manner.







MONZONITE

L/s = gal/min(0.063)

m = ft(0.3048)

°C=5/9(°F-32)

microsecond/m=microsecond/ft(0.3048)

cm = in(2.54)

km = mi(1.6093)

